

## SYRINGE HOLDER FOR BALLOON CATHETER AND SYRINGE SET FOR BALLOON CATHETER

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of U.S. application Ser. No. 11/128,092 filed May 11, 2005, by Ryuji NAGAMATSU, entitled SYRINGE HOLDER FOR BALLOON CATHETER AND SYRINGE SET FOR BALLOON CATHETER, which claims the benefit of priority from prior Japanese Patent Application No. 2004-143616, filed on May 13, 2004, the entire contents of which is incorporated herein by reference.

### BACKGROUND OF THE INVENTION

#### [0002] 1. Field of the Invention

[0003] The present invention relates to a technique to store and retain a syringe used for a balloon catheter. More specifically, the invention relates to a syringe holder and a syringe set with the syringe stored in the syringe holder.

#### [0004] 2. Description of the Related Art

[0005] A balloon catheter is an instrument for administering medical treatment for a living body. The balloon catheter includes a catheter to be inserted into a body, and is provided with a balloon at the distal end of the catheter. The balloon is formed by covering a tube on the outer periphery of the catheter and fixing the both ends thereof. The catheter is formed with a lumen communicating with the inside of the balloon, and the balloon can be inflated by sending air into the lumen (for example, see JP-A-2002-143311).

[0006] In the related art, when using the balloon catheter in a luminal structure, barium meal is used for taking X-ray movie for control the amount of air to be supplied while observing the diameter of the balloon in many cases. In this case, the balloon can be observed clearly along the outline thereof at a portion pushed against an inner wall of the luminal structure since the barium meal is moved away at this portion. However, at a portion of the balloon which is hidden by the barium meal, the outline thereof cannot be observed clearly, and hence the precise size of the balloon cannot be obtained.

[0007] To cope with this problem, there is a technique for providing a plurality of syringes having different capacities in advance so that the size of the balloon can be controlled without using X-rays, and using a syringe of a desired capacity in connection with the balloon catheter for controlling the size of the balloon. In this case, the plurality of syringes are prepared in a sterilized packages for the balloon catheter and a required syringe is taken out from the sterilized package for use. Alternatively, there is a case where a plurality of syringes are stored in a sterilized package and the sterilized package is stored in another sterilized package for the balloon catheter.

[0008] However, in the case where the plurality of syringes are stored in the sterilized package, the syringes are often scattered in the sterilized package during transportation, and hence it is difficult to take a required syringe. When the sterilized package in which only the syringes are stored is stored in another sterilized package, since the syringes are packed twice, it takes time for taking the syringe out. In view

of efficiency of manipulation, it is preferable that an operator can select a syringe optimal for manipulation easily out of the plurality of syringes that are similar in appearance.

### BRIEF SUMMARY OF THE INVENTION

[0009] The present invention provides a syringe holder for a balloon catheter which can hold a plurality of syringes so as to be capable of being attached and detached.

[0010] In this arrangement, the plurality of syringes can be treated together as a single unit. Since the syringes are held so as to be capable of being attached and detached, an operator can take only a required syringe when in use.

[0011] Preferably, a holding part for holding the syringe is formed with an allowance with respect to the contour of the syringe, and an inner surface includes at least one protrusion.

[0012] In this arrangement, the syringe and the syringe holder do not come into tight-contact with each other and there exists a clearance therebetween. Since the syringe is supported by the protrusion, the contact area between the syringe and the holding part is reduced. It has an advantage in that gas can intrude easily into the syringe during sterilizing treatment. As a method of defining the clearance, a non-circular cross-section may be employed for the holding part.

[0013] Preferably, the sizes of the plurality of holding parts are not identical, so as to be capable of accommodating the syringes having different outer diameters.

[0014] In this arrangement, the plurality of syringes having different sizes can be accommodated. This is an advantageous characteristic for a case in which the amount of expansion of the balloon is controlled by the size of the syringe which supplies fluid. Since the operator can select a suitable syringe out of the plurality of syringes having different sizes by intuition, the working efficiency is improved.

[0015] Preferably, the holding part includes a flat portion for constraining rotation of the syringe by coming into abutment with a flange of the syringe.

[0016] In this arrangement, the rotation of the syringe stored in the syringe holder can be constrained. Therefore, when there are indications on the surfaces of the syringes, a uniform orientation of the indications is achieved, and hence visibility is improved.

[0017] Preferably, the holding part is formed with an opening for allowing a distal portion of the syringe on the side of a connecting portion thereof to be projected, which is to be connected to the balloon catheter.

[0018] In this arrangement, the syringe can be separated from the syringe holder easily by gripping the projected portion.

[0019] The holding part may be, for example, a storage groove, which is a groove having an opening to which the syringe can be inserted. When the holding part is the groove, the syringe can be inserted easily from the opening. When the storage groove is employed, a projection for preventing the stored syringe from coming off may be provided at an upper portion thereof. When the syringe holder has resil-